Experimental Design – Fall 2024
Midterm Review Sheet

The midterm will be an open book and open computer test. You are free to use any resources you want but must work independently.

1. **You should be able to identify the appropriate test and analyze datasets using the following statistical tests in R.**
   - T-test
     - one sample
     - two sample
     - paired
   - Correlation Tests
   - Binomial Test
   - Chi-Square Test
   - Permutation Test
   - Levene's Test
   - Mann-Whitney Test

2. **You should know the meaning and understand the following words or topics:**

   - P-value
   - Statistic
   - Parameter
   - Accuracy
   - Precision
   - Reproducibility Crisis
   - P-hacking
   - File drawer problem
   - Bias
   - Continuous vs Discrete
   - Data Transformations
   - Multiple Comparison

3. **You should be able to write R code using any of these functions.**

read.csv	while	t.test	rexp
write.csv	if	chisq.test	table
matrix	binom.test	list	data
c	sample	length	
for	mean	rnorm	

4. You should be able to properly use operators like: `<- == != + - / * %in% %%`

5. Load the iris dataset `data(iris)` and use an appropriate test to determine if the species *setosa* and *virginica* have different sepal lengths

6. Determine whether the petal width of the species *setosa* and *versicolor* are different. If you need to use a nonparametric test use a permutation test.

7. You have a fish tank with swordtail fish in it. They have 39 babies and as they grow you notice that you ended up with 26 males. Does data from your fish suggest that they have an unequal sex ratio? Provide a p-value with your answer

8. Read the fight.csv file from the course website. Does winning fights have an impact on beetle behavior? Does losing fights have an impact on beetle behavior? Provide the p-value and type of test used for each test you perform.